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FLOOD INSURANCE STUDY

TOWN OF HUNTINGTON, MASSACHUSETTS
HAMPSHIRE COUNTY

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COMPLETED

JULY 15, 1988

Federal Emergency Management Agency

COMMUNITY NUMBER - 250165

ORIGINAL

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program (NFIP) have established repositories of flood hazard data for floodplain management and flood insurance study purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

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FLOOD INSURANCE STUDY
TOWN OF HUNTINGTON, HAMPSHIRE COUNTY, MASSACHUSETTS

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Town of Huntington, Hampshire County, Massachusetts, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were prepared by the New England Division of the U. S. Army Corps of Engineers (COE) for the Federal Emergency Management Agency (FEMA), under Inter-Agency Agreement No. EMW-E-0941. This work was completed in April 1986.

1.3 Coordination

On July 20, 1983, an initial Consultation and Coordination Officer's (CCO) meeting was held with representatives from FEMA, the town, and the COE (the study contractor) to determine the streams to be studied by detailed methods and to obtain flood information currently available concerning the community.

On December 16, 1986, a final CCO meeting was held with representatives from FEMA, the town, and the study contractor to review the results of the study.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Town of Huntington, Hampshire County, Massachusetts. The area of study is shown on the Vicinity Map (Figure 1).

The following streams were studied by detailed methods:

Stream	Limits of Detailed Methods
Westfield River	from the downstream corporate limits upstream approximately 5.3 miles to the downstream side of Knightville Dam;
Middle Branch	from the confluence with the Westfield River upstream to the Littleville Dam;
West Branch Westfield River	for its entire length within the community;
Pond Brook	from its confluence with the Westfield River upstream to a point approximately 1 mile upstream of Searles Road; and
Tributary to Westfield River	from its confluence with the Westfield River upstream approximately 0.55 mile to Basket Road.

The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction through April 1991.

The following flooding sources were studied by approximate methods: the East Branch Westfield River, the Little River, Tucker Branch, Sykes Branch, Roaring Branch, Dead Branch, Shop Brook, and Adam Swamp. Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon by, FEMA and the Town of Huntington.

2.2 Community Description

The Town of Huntington is located in Hampshire County in western Massachusetts. It is approximately 110 miles west of Boston and approximately 145 miles northeast of New York City. It is bordered by the Town of Chesterfield to the north, the Towns of Westhampton and Southampton to the east, the Towns of Montgomery and Russell to the south, the Town of Blandford to the southwest, and the Towns of Chester and Worthington to the west.

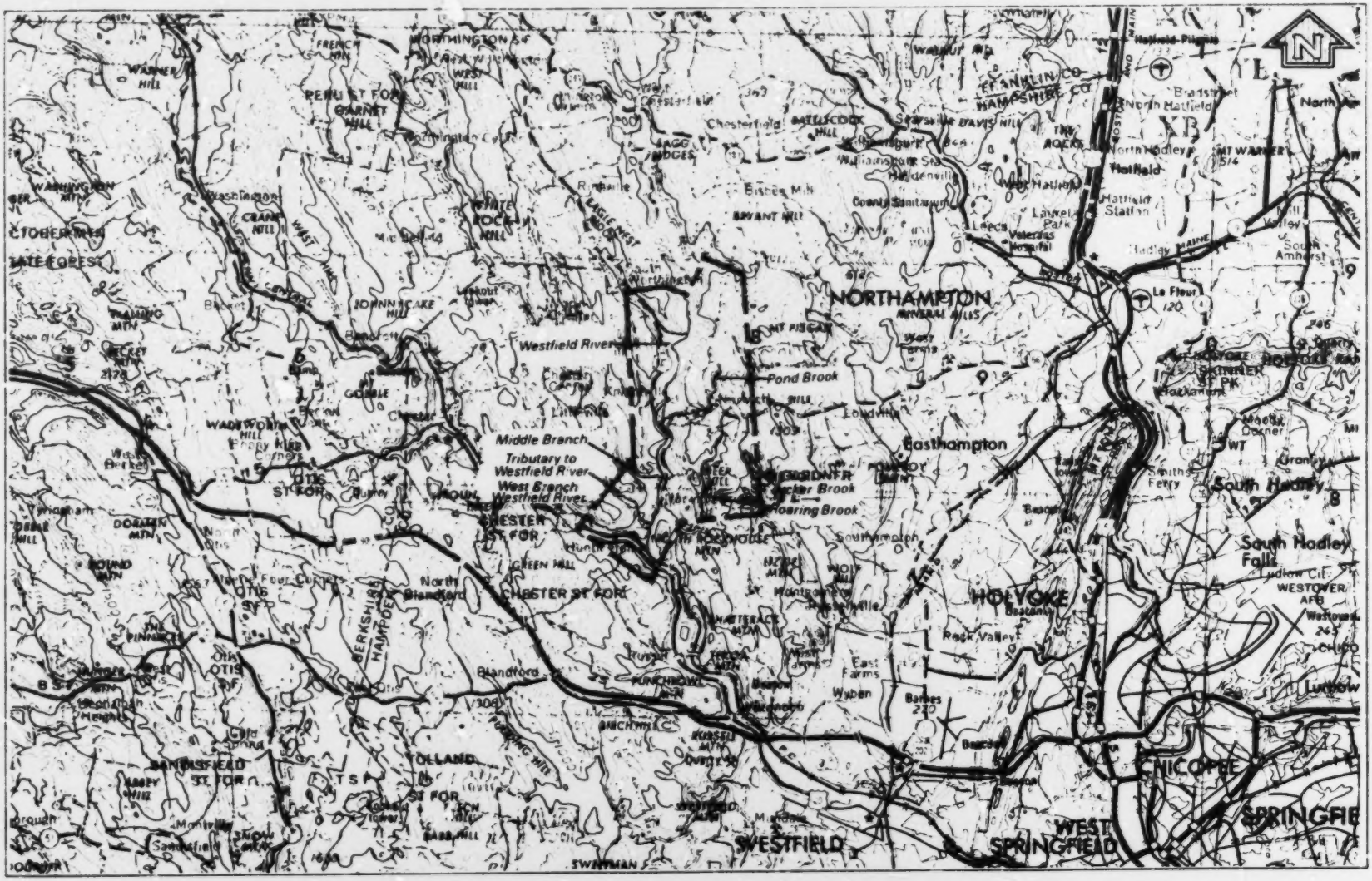

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF HUNTINGTON, MA

(HAMPSHIRE CO.)

APPROXIMATE SCALE

0 4 8 12 MILES

VICINITY MAP

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The total land area within the Town of Huntington is 26.24 square miles. In 1980, the population of the town was 1,804 an increase of 13.2 percent over the 1970 population with a population density of 69 persons per square mile (Reference 1). The projected increase from 1980 to 1990 is 9.4 percent.

The Town of Huntington was originally incorporated as the Town of Norwich; the name changed on March 9, 1955. Goods originally produced by the early settlers of the area were sugar, molasses, flax, and fine linen, and by 1826 an axe factory and two dressing cloth factories were in operation. The advent of the railroad proved to be a considerable advantage to business and manufacturing development, including the building of a paper mill. Today, however, Huntington is almost exclusively a residential community, with wholesale and retail trade being the largest source of employment. There are also many summer camps and homes built around the Norwich Lake area.

Public highways are the most available means of transportation, principally U. S. Route 20 and State Routes 112 and 66. Bus transportation is limited and only freight is carried on the Penn Central Railroad.

The climate in Huntington is typical of New England weather, with cold winters and short warm summers. The average monthly temperature varies from a high of 71.7 degrees Fahrenheit (^{o}F) in July to 25.1^{o}F in January. Freezing temperatures can be expected from the middle of October to the middle of April. Precipitation is frequent but in short duration, produced by local thunderstorms and frontal storm systems. The mean annual precipitation is 48.75 inches and is uniformly distributed throughout the year.

Huntington's topography is characterized by a series of valleys through which streams and brooks flow, bounded by rounded hills that range in elevation up to 1,030 feet. The Westfield River, a tributary to the Connecticut River, is the principal stream running through the area.

2.3 Principal Flood Problems

The Town of Huntington is subject to flooding from the Westfield River, Middle Branch, the West Branch Westfield River, the East Branch Westfield River, and several tributaries to these streams. This river system is the fifth largest watershed to the Connecticut River basin. The Westfield River originates in Savoy, New Hampshire. The East Branch meanders in a southeastern direction through rugged terrain as it is fed by numerous small streams. It enters Huntington from the north and confluences with Middle Branch and the West Branch Westfield River in the southern region of the town.

Although flooding may occur in any month, the most severe and frequent floods have occurred in the fall of the year due to storms of tropical origin. Prior to 1900, 15 instances of flooding in the Westfield River basin are known to have occurred; however, data on these events is sparse. Major flooding instances after this time were in November 1927, March 1936, September 1938, August 1955, and October 1955. Of these, all but the 1936 floods were caused by heavy rainfall associated with tropical storms or hurricanes.

The major population center is the village of Huntington, which is located along the confluence of the Westfield River and the West Branch Westfield River. Norwich Pond has a number of summer homes and camps located along or near its shoreline, while the area around Norwich Bridge has several structures in the lowlands abutting the Westfield River. These areas may be affected by flooding in the Westfield basin.

There are three USGS gaging stations located in the Town of Huntington that recorded the floods of record for the tributaries of the main stem of the Westfield River. The station located on the East Branch Westfield River is approximately 3.5 miles north of the village at river mile 29.7 and measures a 162 square mile drainage area. With excellent records dating back to 1909, the flood of record is 37,900 cubic feet per second (cfs) on September 21, 1938. The causative event was a Caribbean storm that dropped heavy rain on previously saturated ground for a period of 26-30 hours. This storm also happens to be the flood of record for the gaging station on Middle Branch located 0.3 mile from its confluence with the Westfield River. A flow of 19,900 cfs was recorded on September 21, 1938, for its 52.6 square mile drainage area.

The remaining gaging station is located on the West Branch Westfield River 1.5 miles upstream from its confluence with the Westfield River. It has been in existence since 1935, and measures a drainage area of 93.7 square miles. Unlike the other two stations, the flood of record occurred on August 19, 1955, with a discharge of 26,100 cfs. Heavy precipitation from Hurricane Diane, which feel upon soil previously saturated by Hurricane Connie caused major flooding throughout the lower Westfield basin (References 2 and 3).

2.4 Flood Protection Measures

Flooding in the town has been influenced considerably by several major projects designed to minimize and control future flood damages on the Westfield River basin and ultimately the Connecticut River basin. The two most significant of these projects are the Knightville Dam and Littleville Reservoir Project. These two structures are part of the currently authorized comprehensive plan for flood protection in the Connecticut River basin consisting of a series of reservoirs and local protection projects on the main tributaries and stem of the river. In 1953, the Connecticut River Flood Control Compact was approved by Congress. This was an interstate agreement

between the basin states to cooperate in flood control problems, which allowed the construction of the reservoir system by dividing costs between benefiting states.

Initiated in 1939 and completed in 1941, the Knightville Dam is of the hydraulic earthfill type with a dumped rock shell. It is located approximately 4 miles north of the main village of Huntington. Normally, all three gates are left open with no storage behind the dam. The dam has a capacity of 49,000 acre-feet, which is equivalent to 5.6 inches of runoff, from the 164 square mile drainage area. When filled, the reservoir is 6 miles long and covers 960 square miles of surface area. The project area is an excellent trout habitat, and hunting, canoeing, camping, and fishing are all popular around the reservoir.

The Knightville Dam has reduced the impact of flooding in the community and beyond since its completion, especially during the flooding events in January 1949, when its entire capacity was utilized, August 1955 and October 1955, when 58 percent and 96 percent of the reservoir was filled, respectively.

The Littleville Dam is located 1 mile upstream from the Middle Branch confluence with the Westfield River, approximately 2.7 miles north of the Town of Huntington. The rolled earth embankment with concrete spillway and two outlets were started in 1962 and completed in September 1965. This is a multipurpose project: 2,300 acre-feet of the storage capacity is for flood control, while 9,400 acre-feet is reserved as a future water supply for the City of Springfield, as a participant under the provisions of the Water Supply Act of 1958. This water supply will yield an average of 17.5 million gallons a day (mgd). The flood control portion of the storage area (23,000 acre-feet) is equivalent to 8.2 inches of runoff from the 52.3 square mile drainage area. A 275 acre lake, located principally in the Town of Chester, is maintained for public and recreational use at the level of the water supply pool. Hunting and fishing are popular, and there is a State-operated trout stocking program in the area.

In October 1959, under emergency work authority, a local protection project was completed along the West Branch Westfield River, approximately 1 mile west of Huntington center. This project protects against the erosion of the Old Chester Road highway embankment by providing approximately 200 feet of rockfill slope protection one each side of the highway, where it adjoins the river. Upon its completion, it was turned over to the Town of Huntington for operation and maintenance (Reference 3).

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood

hazard data required for this study. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each flooding source studied in detail affecting the community.

Peak discharge-frequency relationships for the Westfield River were taken from the Knightville Dam. The 10-year flow of 4,500 cfs represents the peak regulated outflow. The 50- and 100-year flows represent peak regulated flows plus approximately 1 foot depth over spillway. The 500-year flow is the regulated flow plus approximately 2.5 feet flow depth over the spillway. The peak outflow from the two upstream reservoirs, Knightville on the Westfield River and Littleville on Middle Branch, determine the peak flow on the Westfield River between Middle Branch and the confluence of the West Branch Westfield River with the Westfield River. The sum of the outflows form Knightville and Littleville Reservoirs. Peak flows on the Westfield River below the confluence of the West Branch Westfield River are the combined peak flow of the West Branch Westfield River plus 13.3 square miles of local area below the reservoirs. This peak would not coincide with flow from the reservoirs. Peak flows on the West Branch Westfield River were computed by statistical analysis of gaging data. Peak flows from the local area were computed by ratio of drainage areas to those of West Branch.

Peak 10-, 50-, and 100-year frequency discharges of 1,500 cfs on Middle Branch are the maximum regulated releases from the Littleville flood control reservoir and their maximum releases would not coincide with peak runoff from the downstream uncontrolled areas. The peak 500-year discharge of 3,000 cfs represents the peak regulated release plus 1 foot of flow depth over the spillway.

Peak discharge frequencies for the West Branch Westfield River were determined by statistical analysis of the 43 years of flow data taken from the USGS gaging station No. 01181000 at Huntington. Statistical analysis was performed using a log-Pearson Type III distribution (Reference 4). The computed mean, standard deviation, and weighted skew for the 93.7 square mile drainage area were 3.724, 0.291, and 0.291, respectively.

Peak discharge-frequency relationships for Pond Brook and the Tributary to Westfield River were developed from the statistical analysis of USGS gaging station data on the West Branch Westfield River and proportioning by drainage area to Pond Brook and the Tributary to Westfield River. Results agreed closely with peak discharges computed using a regional frequency equation developed for ungaged streams in Massachusetts (Reference 5).

A summary of the drainage area-peak discharge relationships for the streams studied by detailed methods is shown in Table 1, "Summary of Discharges."

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
WESTFIELD RIVER					
At Huntington-Montgomery corporate limits	332.4	14,600	26,600	33,000	53,000
Below confluence of West Branch Westfield River	332	14,600	26,600	33,000	53,000
Below confluence of Middle Branch	222	6,000	7,000	8,500	14,000
At Knightville Dam	162	4,500	6,000	7,000	11,000
MIDDLE BRANCH					
At its confluence with Westfield River	52.8	1,500	1,500	1,500	3,000
At Littleville Dam	52.3	1,500	1,500	1,500	3,000
WEST BRANCH WESTFIELD RIVER					
At its confluence with Westfield River	95.7	12,780	23,360	29,200	46,600
At USGS gaging station No. 01181000	93.7	12,780	23,360	29,200	46,600

TABLE 1 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
POND BROOK					
At its confluence with Westfield River	2.7	368	673	841	1,342
At Norwich Lake	0.9	122	244	280	444
TRIBUTARY TO WESTFIELD RIVER					
At its confluence with Westfield River	1.4	191	349	436	696

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Cross sections for the backwater analyses of the streams studied by detailed methods were obtained from topographic maps at a scale of 1:4,800 with a contour interval of 5 feet and aerial photographs at a scale of 1:12,000 (References 6 and 7). Below water sections were obtained by field measurements, topographic maps, and engineering judgment. All bridges, culverts, and dams were surveyed to obtain elevation data and structural geometry in order to compute the significant backwater effects of these structures.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross-section locations are also shown on the Flood Insurance Rate Map (Exhibit 2).

Water-surface elevations of floods of the selected recurrence intervals were computed using the COE HEC-2 step-backwater computer program (Reference 8). Flood profiles were drawn showing computed water-surface elevations for floods of the selected recurrence intervals. Starting water-surface elevations for the streams studied by detailed methods were determined by normal depth calculations based on cross-sectional information at their downstream limit.

Roughness coefficients (Manning's "n") used in the hydraulic computations were determined on the basis of field inspection, analysis of photographs, and engineering judgment. The channel and overbank "n" values for the streams studied by detailed methods are shown in the following tabulation:

Stream	Channel "n"	Overbank "n"
Westfield River	0.030	0.060
Middle Branch West Branch Westfield River	0.030 - 0.035	0.060 - 0.065
Pond Brook	0.035	0.058
Tributary to Westfield River	0.030 - 0.035	0.060 - 0.065
	0.030 - 0.035	0.060 - 0.065

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in this study are shown on the maps; the descriptions of the marks are presented in Elevation Reference Marks (Exhibit 3).

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2 percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For the streams studied in detail, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:4,800 with a contour interval of 5 feet (Reference 6).

For the flooding sources studied by approximate methods, the 100-year flood boundaries were delineated using the Flood Hazard Boundary Map for the Town of Huntington (Reference 9).

The 100- and 500-year floodplain boundaries are shown on the Flood Insurance Rate Map (Exhibit 2). On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A and AE), and the 500-year floodplain boundary corresponds to the boundary of areas of moderate flood

hazards. In cases where the 100- and 500-year floodplain boundaries are close together, only the 100-year floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, only the 100-year floodplain boundary is shown on the Flood Insurance Rate Map (Exhibit 2).

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as a minimum standard that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this study were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections (Table 2). The computed floodways are shown on the Flood Insurance Rate Map (Exhibit 2). In cases where the floodway and 100-year floodplain boundaries are either close together or collinear, only the floodway boundary is shown.

The area between the floodway and 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 2.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Westfield River								
A	790	209	2,226	14.8	344.1	344.1	345.1	1.0
B	1,450	220	1,979	16.7	347.7	347.7	348.4	0.7
C	4,850	190	2,466	13.4	362.9	362.9	363.8	0.9
D	6,040	141	1,677	19.7	368.6	368.6	369.0	0.4
E	6,740	200	2,060	16.0	373.9	373.9	374.5	0.6
F	7,880	218	2,087	15.8	381.6	381.6	381.9	0.3
G	8,450	204	2,442	13.5	385.4	385.4	386.2	0.8
H	10,160	220	2,849	11.6	390.6	390.6	391.5	0.9
I	10,216	282	3,652	9.0	391.9	391.9	392.6	0.7
J	12,050	322	2,393	13.8	396.4	396.4	396.4	0.0
K	13,200	478	3,998	2.1	401.7	401.7	402.7	1.0
L	14,500	319	1,502	5.7	401.8	401.8	402.6	0.8
M	15,470	139	823	10.3	403.5	403.5	404.3	0.8
N	17,300	68	531	16.0	416.9	416.9	417.1	0.2
O	18,300	134	897	9.5	425.0	425.0	425.9	0.9
P	20,250	87	586	14.5	435.2	435.2	435.2	0.0
Q	22,010	133	934	9.1	444.1	444.1	445.1	1.0
R	23,030	120	702	12.1	448.6	448.6	448.6	0.0
S	23,600	115	721	11.8	451.5	451.5	451.9	0.4
T	25,350	88	580	14.7	461.6	461.6	461.8	0.2
U	26,600	145	1,044	8.1	468.2	468.2	468.9	0.7
V	27,510	66	462	15.2	473.9	473.9	473.9	0.0

[1]Feet above corporate limits

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF HUNTINGTON, MA
(HAMPSHIRE CO.)

FLOODWAY DATA

WESTFIELD RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Middle Branch								
A	1,200[1]	59	178	8.4	404.6	404.6	405.6	1.0
B	1,760[1]	100	537	2.8	407.0	407.0	408.0	1.0
C	1,805[1]	100	541	2.8	407.1	407.1	408.1	1.0
D	2,850[1]	92	292	5.1	408.2	408.2	408.7	0.5
E	4,160[1]	52	154	9.8	420.7	420.7	420.7	0.0
F	4,760[1]	25	120	12.5	436.3	436.3	436.3	0.0
West Branch Westfield River								
A	1,180[2]	378	2,249	13.0	362.0	362.0	362.0	0.0
B	2,390[2]	283	5,056	5.8	367.9	367.9	368.9	1.0
C	2,445[2]	265	4,925	5.9	368.5	368.5	369.5	1.0
D	3,900[2]	337	2,030	14.4	375.4	375.4	375.4	0.0
E	6,460[2]	167	2,152	13.6	392.4	392.4	392.9	0.5
F	7,100[2]	207	2,813	10.4	398.5	398.5	399.5	1.0
G	7,970[2]	426	4,648	6.3	404.3	404.3	405.1	0.8
H	9,220[2]	292	2,520	11.6	410.3	410.3	411.2	0.9
I	10,930[2]	608	5,353	5.5	423.3	423.3	424.2	0.9
J	12,130[2]	609	4,431	6.6	428.6	428.6	429.5	0.9
Pond Brook								
A	220[2]	26	104	8.1	459.6	459.6	460.6	1.0
B	2,190[2]	30	87	9.7	562.6	562.6	562.6	0.0
C	3,370[2]	24	80	10.5	640.3	640.3	640.3	0.0
D	5,190[2]	23	79	10.6	761.7	761.7	761.7	0.0
E	6,430[2]	18	74	11.4	867.3	867.3	867.5	0.2

[1]Feet above corporate limits
[2]Feet above confluence with Westfield River

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF HUNTINGTON, MA
(HAMPSHIRE CO.)

FLOODWAY DATA

MIDDLE BRANCH - WEST BRANCH WESTFIELD RIVER - POND BROOK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Pond Brook (continued)								
F	7,020	65	440	1.9	912.0	912.0	912.9	0.9
G	7,860	24	80	10.5	966.4	966.4	966.4	0.0
H	9,574	103	582	1.4	1,051.0	1,051.0	1,052.0	1.0
I	10,626	65	417	2.0	1,065.8	1,065.8	1,066.8	1.0
J	12,420	46	110	7.6	1,081.1	1,081.1	1,081.7	0.6
K	13,380	45	147	5.7	1,089.2	1,089.2	1,090.1	0.9
L	14,480	47	150	5.6	1,096.0	1,096.0	1,096.6	0.6
M	15,990	45	54	5.2	1,106.8	1,106.8	1,107.3	0.5
Tributary to Westfield River								
A	470	34	73	5.9	386.6	386.6	387.2	0.6
B	930	12	45	9.7	396.6	396.6	397.4	0.8
C	1,850	12	44	9.9	417.6	417.6	417.6	0.0
D	2,925	12	67	6.5	464.0	464.0	464.4	0.4

[1]Feet above confluence with Westfield River

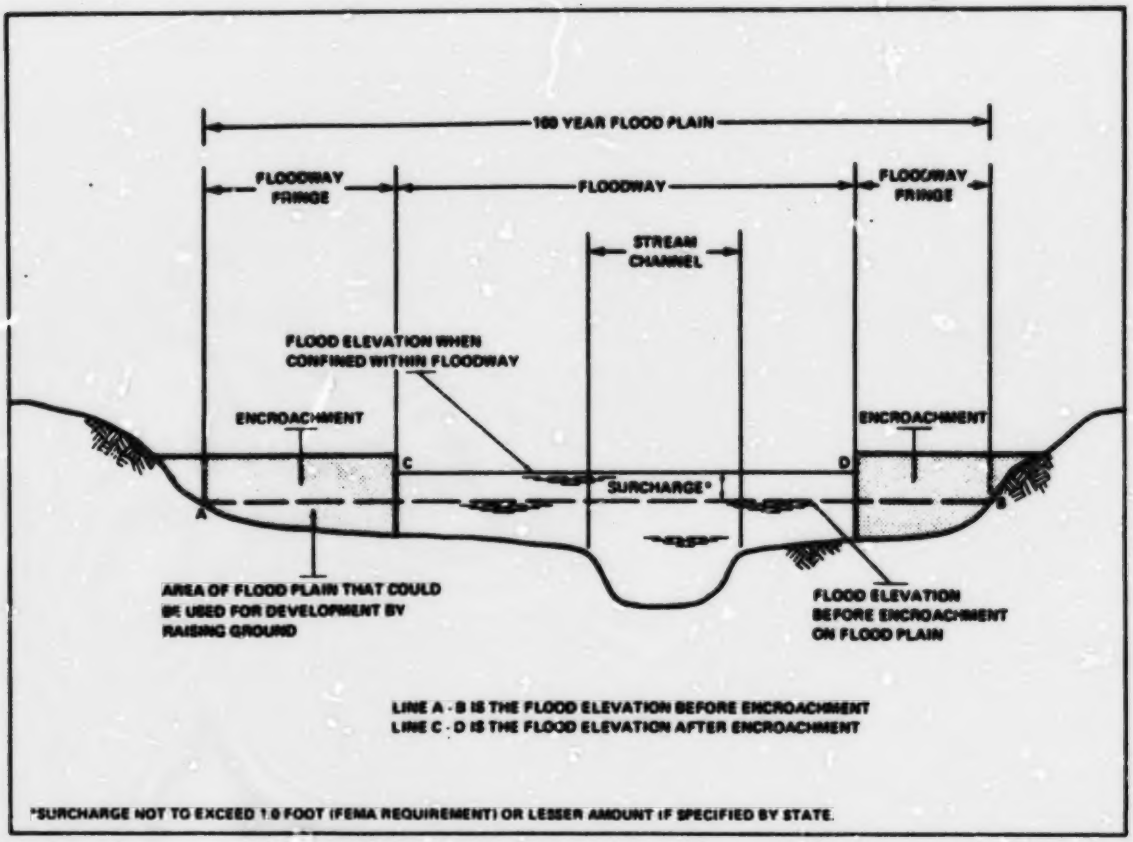
TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF HUNTINGTON, MA
(HAMPSHIRE CO.)

FLOODWAY DATA

POND BROOK - TRIBUTARY TO WESTFIELD RIVER


100 YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE A - B IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE C - D IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE.

FLOODWAY SCHEMATIC Figure 2

5.0 INSURANCE APPLICATIONS

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. The zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. In most instances, whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

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Zone AH

Zone AH is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AO

Zone AO is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-depths derived from the detailed hydraulic analyses are shown within this zone.

Zone A99

Zone A99 is the flood insurance rate zone that corresponds to areas of the 100-year floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or depths are shown within this zone.

Zone V

Zone V is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are performed for such areas, no base flood elevations are shown within this zone.

Zone VE

Zone VE is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year floodplain, areas within the 500-year floodplain,and to areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

Zone D

Zone D is the flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols, the 100- and 500-year floodplains. Floodways and the locations of selected cross sections used in the hydraulic analyses and floodway computations are shown where applicable.

7.0 OTHER STUDIES

Flood Insurance Studies for the Towns of Southampton, Westhampton, and Chester have been published (References 10, 11, and 12). The results of this study are in agreement with the results of the Southampton and Westhampton studies. The results of this study are not in agreement with the results of the Chester study because this study used updated hydrologic and hydraulic analyses to study flood boundaries and elevations.

Due to its more detailed analyses, this study supersedes the Flood Hazard Boundary Map for the Town of Huntington (Reference 9).

8.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting FEMA, the Natural and Technological Hazards Division, J. W. McCormack Post Office and Courthouse Building, Room 462, Boston, Massachusetts 02109.

9.0 BIBLIOGRAPHY AND REFERENCES

1. U. S. Department of Commerce, Bureau of the Census, 1980 Census of Population, Number of Inhabitants, Massachusetts, Washington, D. C., U. S. Government Printing Office, 1981.

2. U. S. Army Corps of Engineers, New England Division, Water Resources Development in Massachusetts, Waltham, Massachusetts, 1981.

3. U. S. Army Corps of Engineers, New England Division, Flood Plain Information, Westfield and Little Rivers, Westfield, Massachusetts, Waltham, Massachusetts, June 1969.

4. U. S. Department of the Interior, Geological Survey, Office of Water Data Collection, Interagency Advisory Committee on Water Data, "Guidelines for Determining Flood Flow Frequency," Bulletin 17B, Reston, Virginia, Revised September 1981.

5. U. S. Department of the Interior, Geological Survey, Estimating Peak Discharges of Small Streams in Massachusetts, Washington, D. C., 1982.

6. U. S. Army Corps of Engineers, New England Division, Topographic Maps, Scale 1:4,800, Contour Interval 5 Feet: Huntington, Massachusetts, 1984.

7. U. S. Army Corps of Engineers, New England Division, Aerial Photographs, Scale 1:12,000: Huntington, Massachusetts, 1984.

8. U. S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water Surface Profiles, Generalized Computer Program, Davis, California, September 1982.

9. U. S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Town of Huntington, Hampshire County, Massachusetts, December 17, 1976.

10. Federal Emergency Management Agency, Federal Insurance Administration, Flood Insurance Study, Town of Southampton, Hampshire County, Massachusetts, Washington, D. C., December 4, 1979.

11. Federal Emergency Management Agency, Federal Insurance Administration, Flood Insurance Study, Town of Westhampton, Hampshire County, Massachusetts, Washington, D. C., July 2, 1979.

U. S. Department of the Interior, Geological Survey, 7.5-Minute Series Topographic Maps, Scale 1:25,000, Contour Interval 10 Feet: Blandford, Massachusetts, 1975; Chester, Massachusetts, 1975; Westhampton, Massachusetts, 1975; Woronoco, Massachusetts, 1975.

EXHIBIT 3 - ELEVATION REFERENCE MARKS

Reference Mark	FIRM Panel	Elevation (Feet NGVD)	Description of Location
RM 1	06	685.37	Standard USGS disk, stamped TT 33 CIH set in upstream side of west wing wall of State Route 112 bridge over Sikes Hill Brook.
RM 2	06	513.84	Nail in center of driveway approximately 330 feet west of State Route 112 bridge over the Westfield River.
RM 3	06	457.94	PK nail in end of white stop line at northwest corner of intersection of State Route 66 and State Route 112.
RM 4	07	721.88	PK nail in centerline of intersection of State Route 66 and Bean Hill Road.
RM 5	07	1,067.48	Nail in centerline of Searles South Road at southwest edge of intersection with State Route 66.
RM 6	07	1,084.71	Nail in center of State Route 66 opposite dirt clearing, approximately 840 feet southeast of intersection with Searles South Road.
RM 7	08	416.44	Nail in centerline of intersection of North Chester Road and Goss Hill Road.
RM 8	08	455.25	Nail in center of driveway to rest area approximately 10 feet northwest of white line at north edge of U. S. Route 20.
RM 9	08	402.82	Nail in centerline of Mountain View Terrace on white line at east edge of State Route 112.
RM 10	08	387.34	Centerline of Basket Street, approximately 25 feet south of intersection of Basket Street and centerline of driveway located approximately 90 feet west of Maple Street.
RM 11	08	352.13	Western side stripe of U. S. Route 20 at centerline of driveway to St. Thomas Cemetery.

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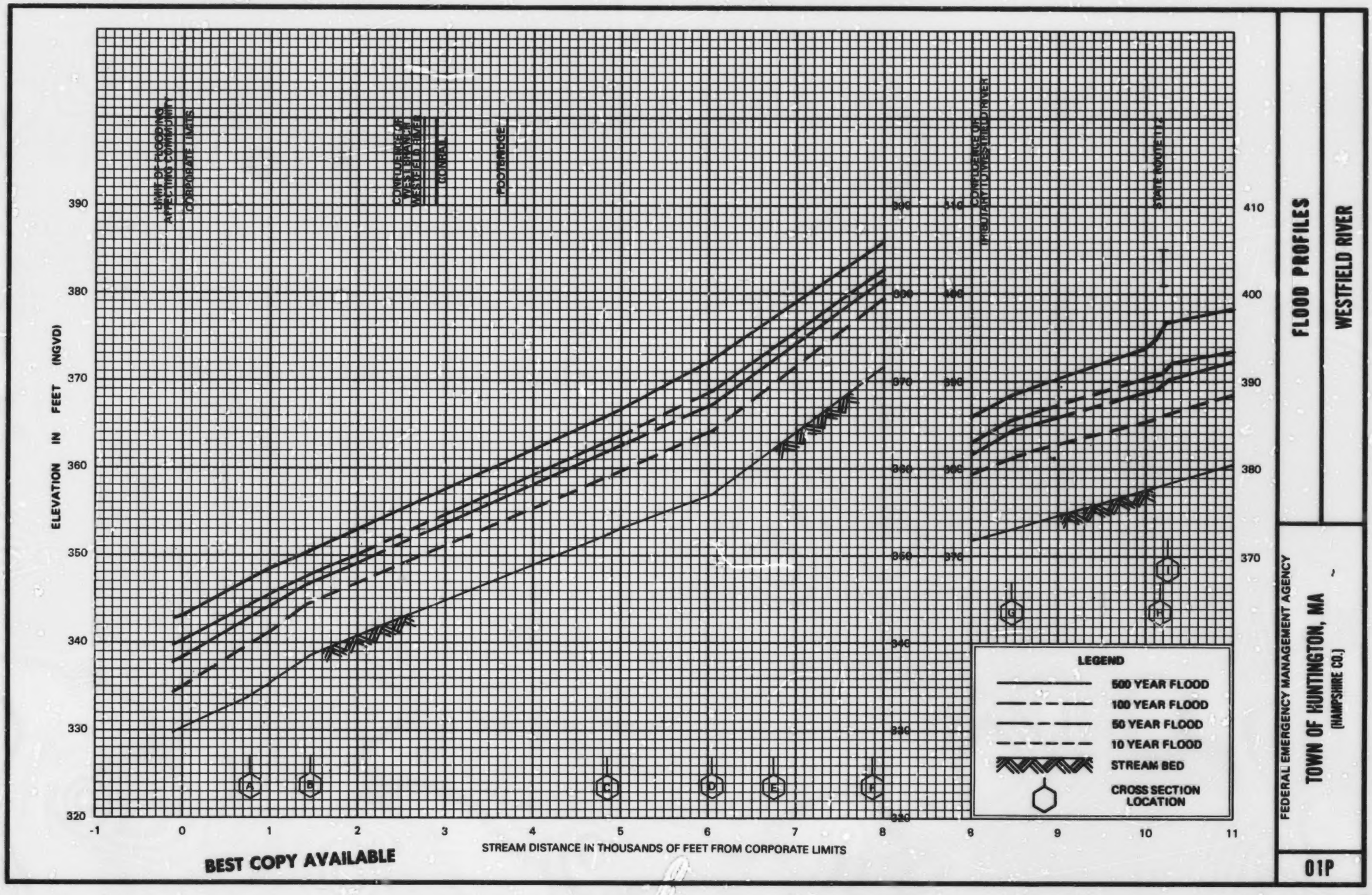

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FLOOD PROFILES

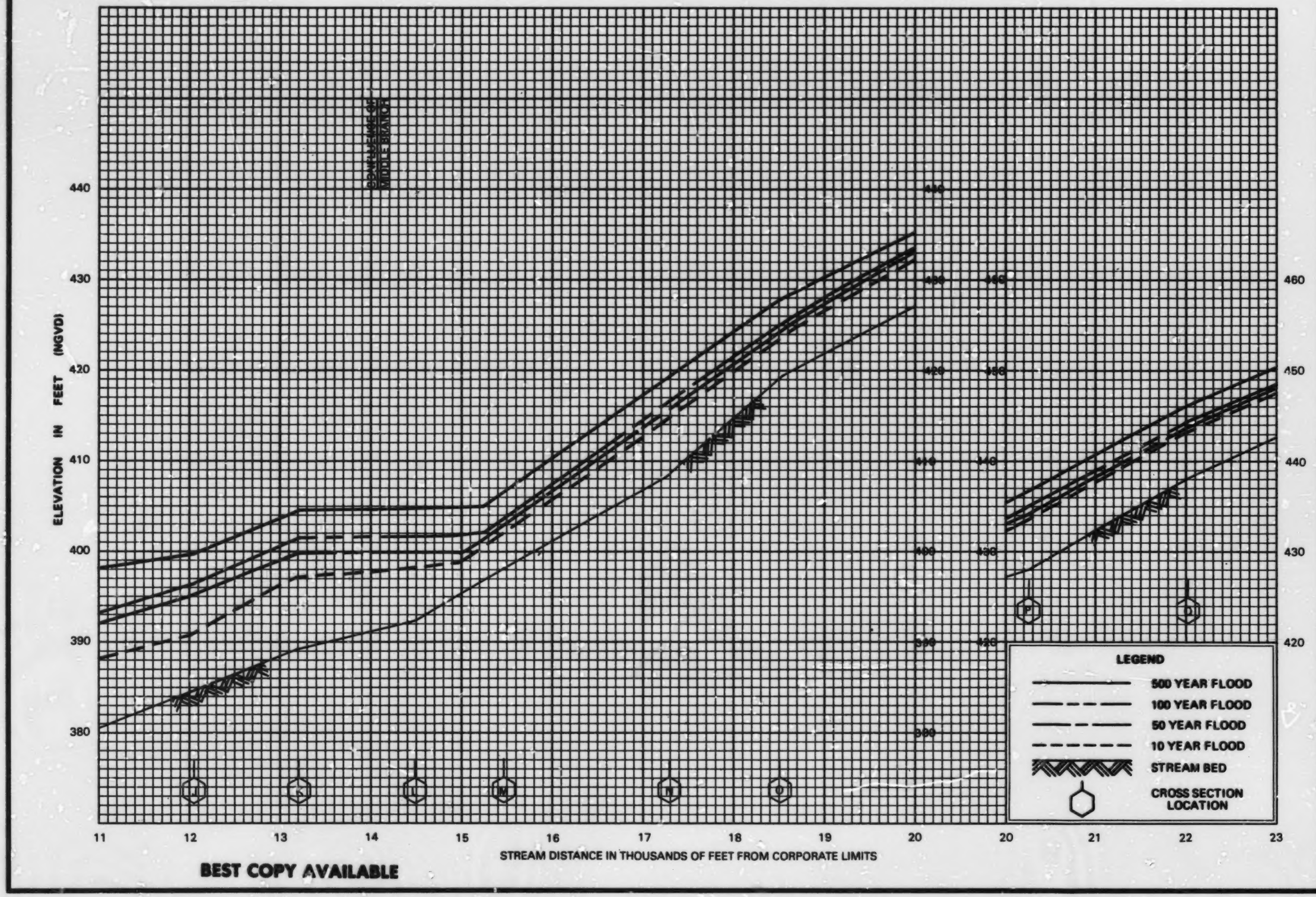
WESTFIELD RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF HUNTINGTON, MA

(HAMPSHIRE CO.)

01P



FLOOD PROFILES

WESTFIELD RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF HUNTINGTON, MA

(HAMPSHIRE CO.)

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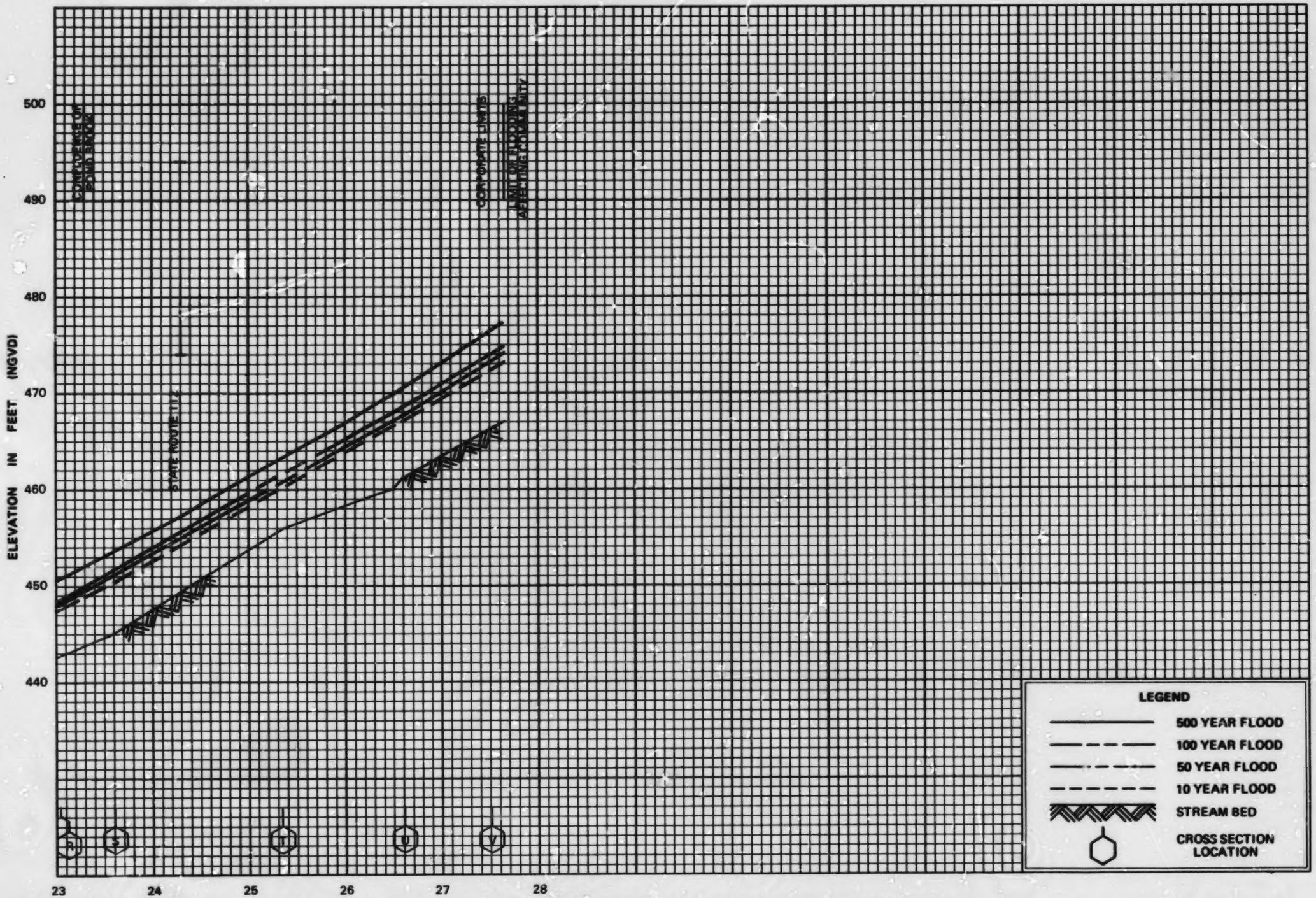

FLOOD PROFILES

WESTFIELD RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF HUNTINGTON, MA
(HAMPSHIRE CO.)

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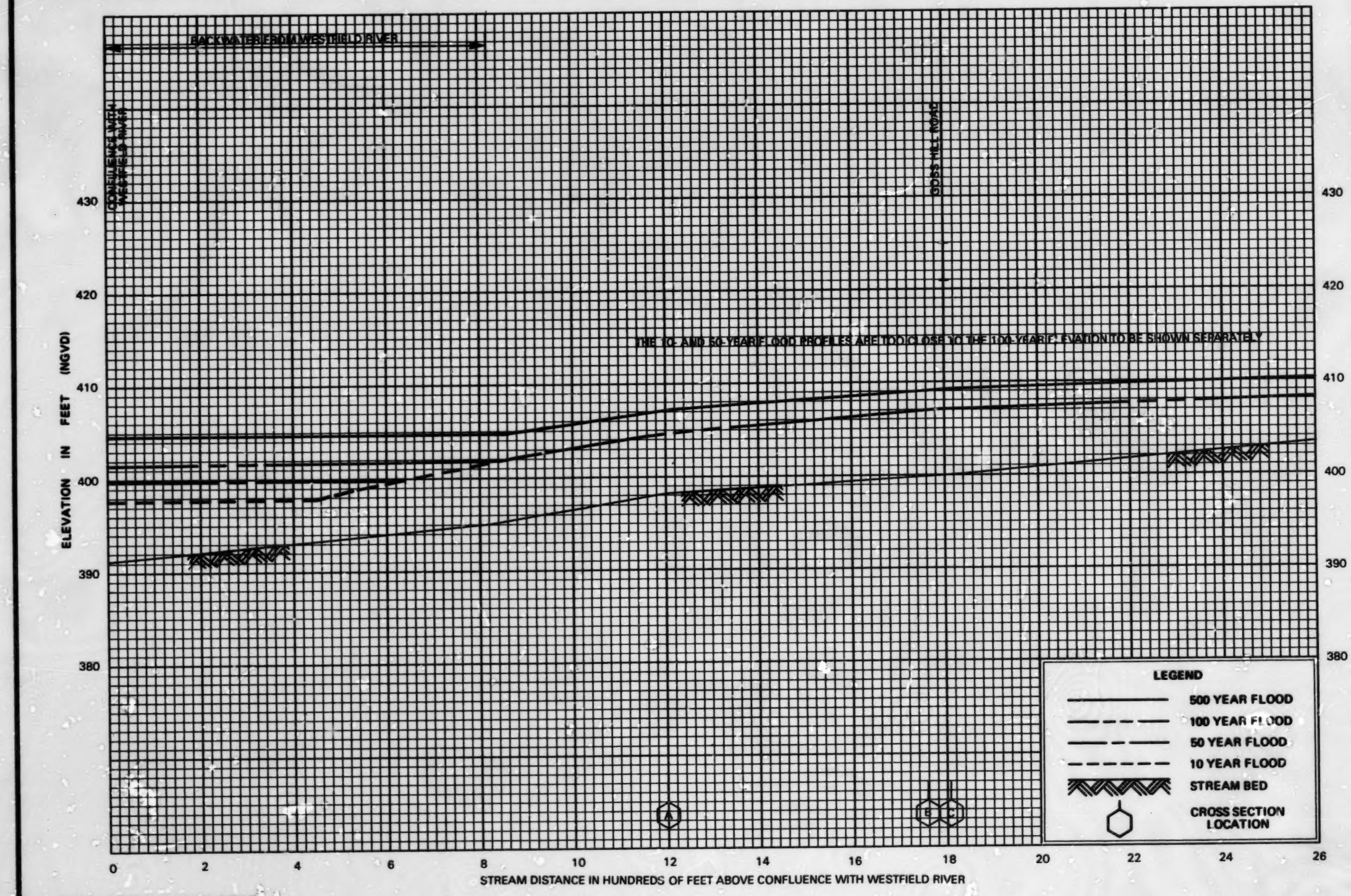

FLOOD PROFILES

MIDDLE BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF HUNTINGTON, MA

(HAMPSHIRE CO.)

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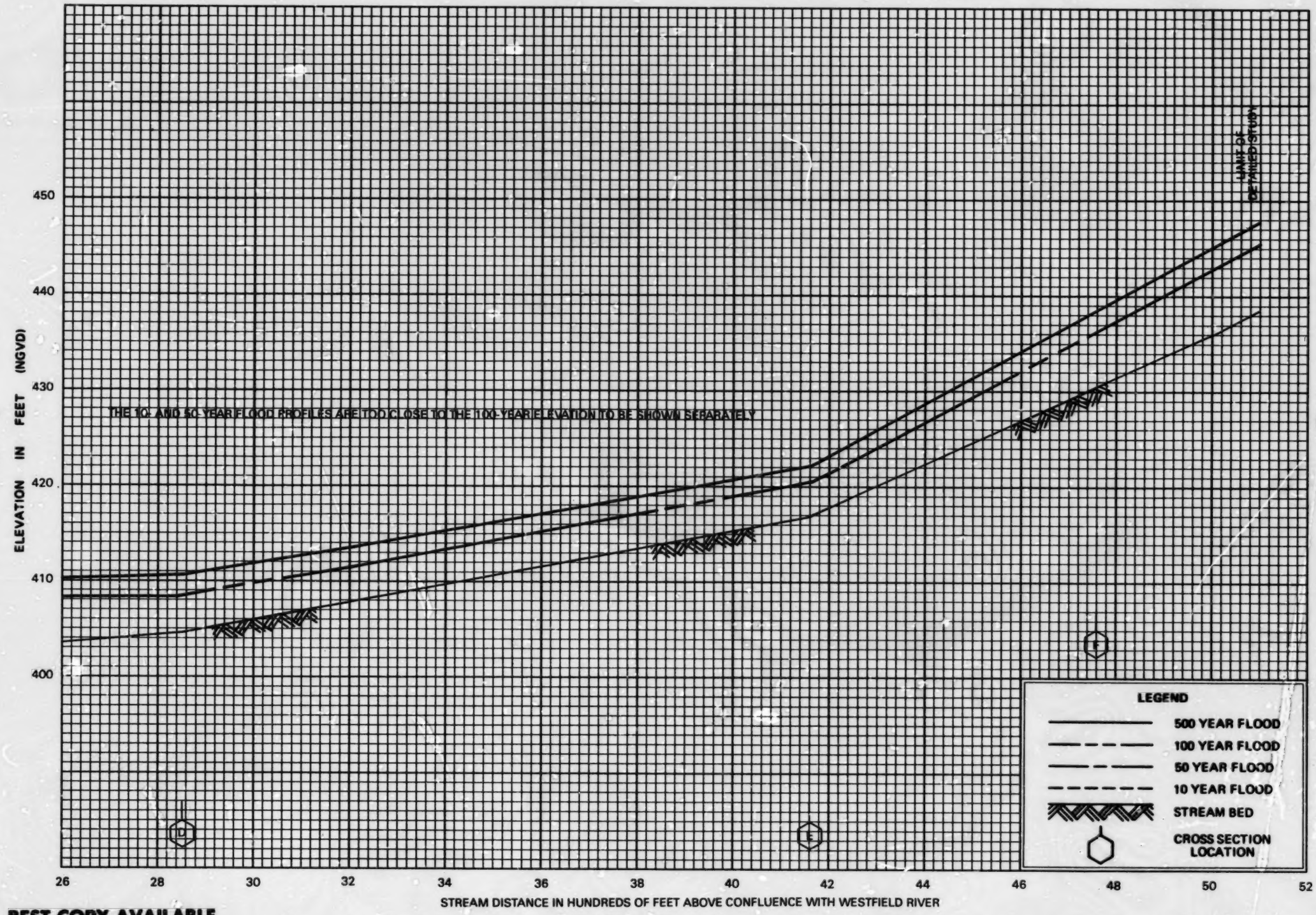

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FLOOD PROFILES

MIDDLE BRANCH

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TOWN OF HUNTINGTON, MA
(HAMPSHIRE CO.)

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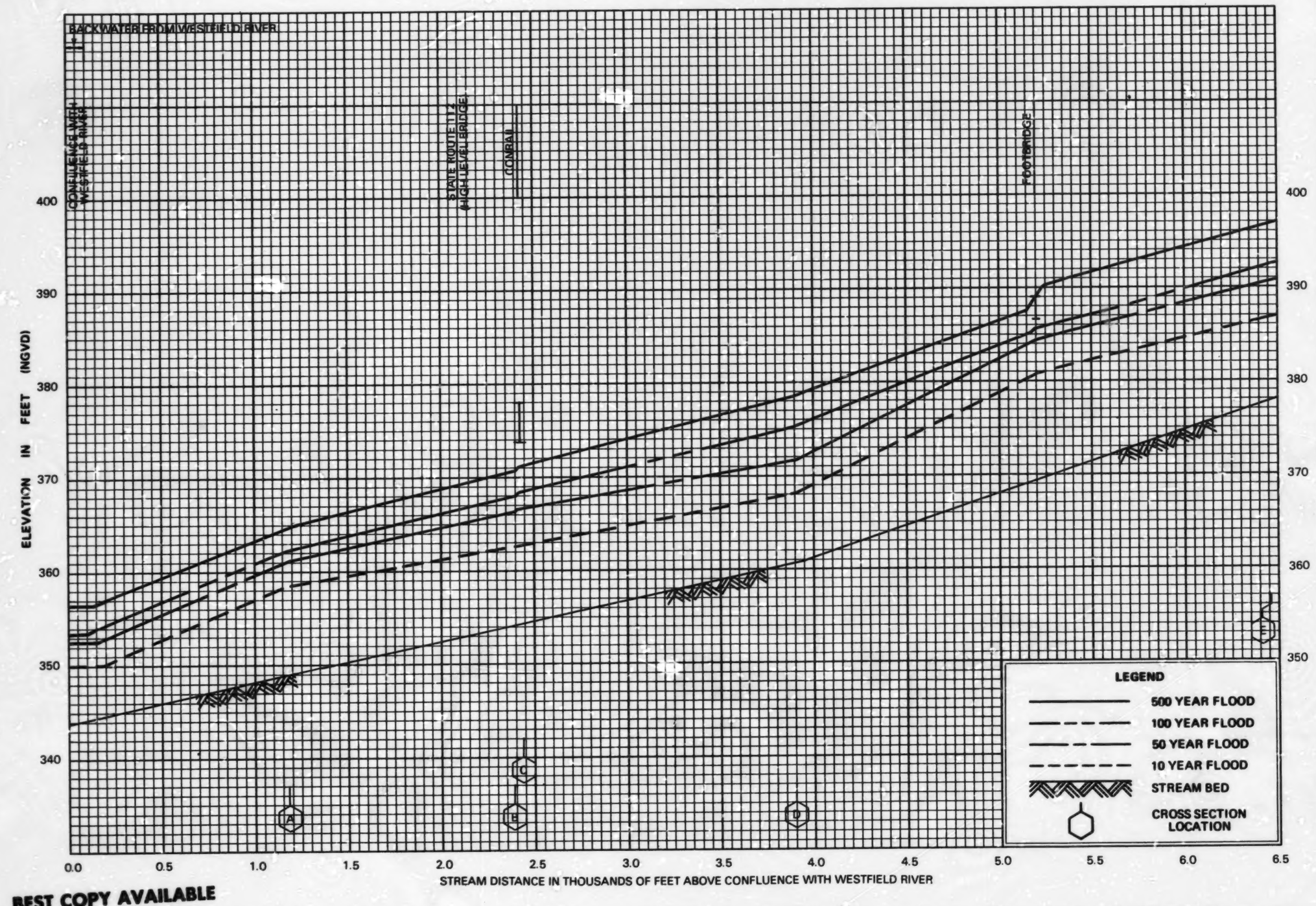

FLOOD PROFILES

WEST BRANCH WESTFIELD RIVER

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TOWN OF HUNTINGTON, MA
(HAMPSHIRE CO.)

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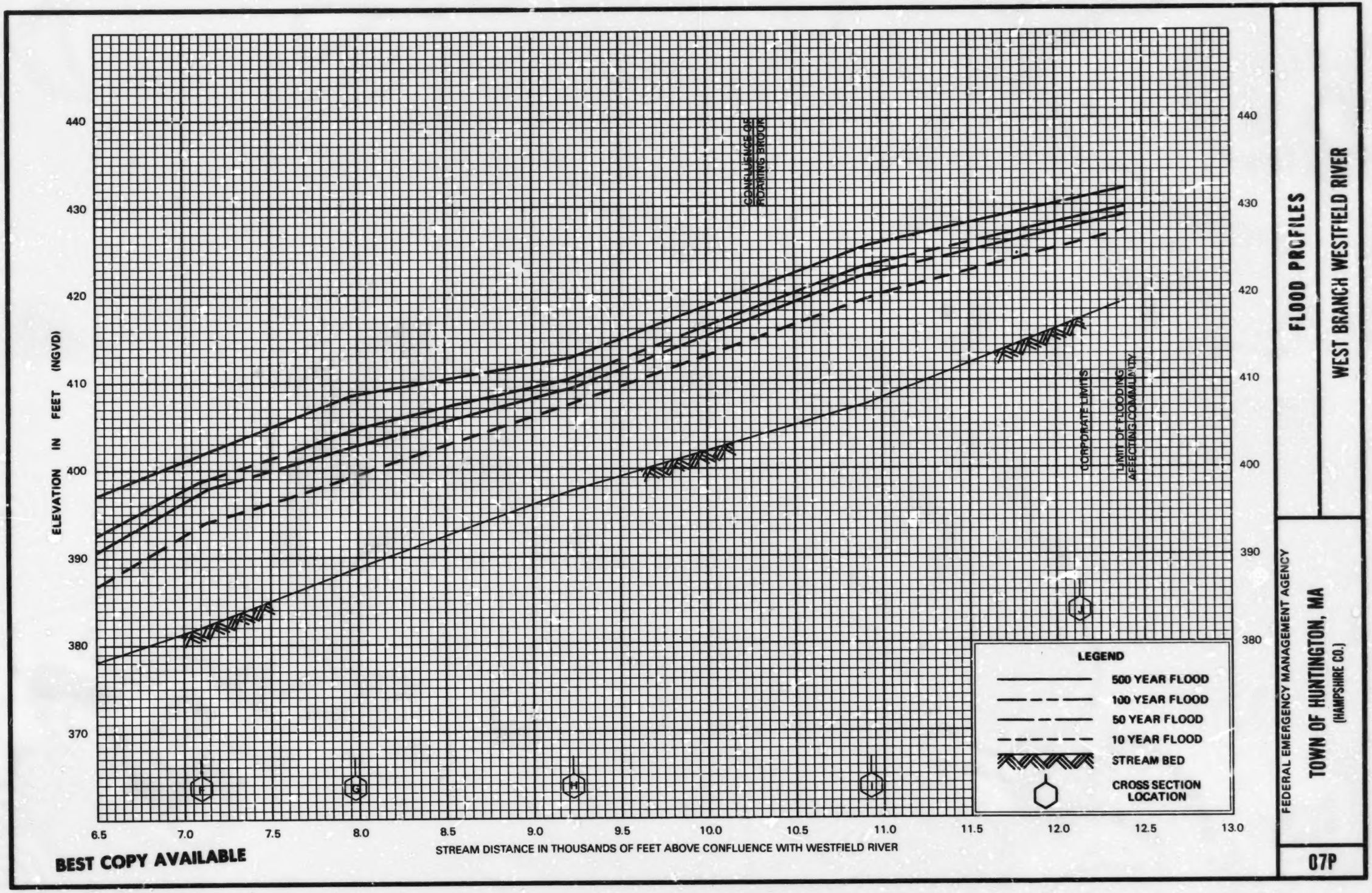

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FLOOD PROFILES

POND BROOK

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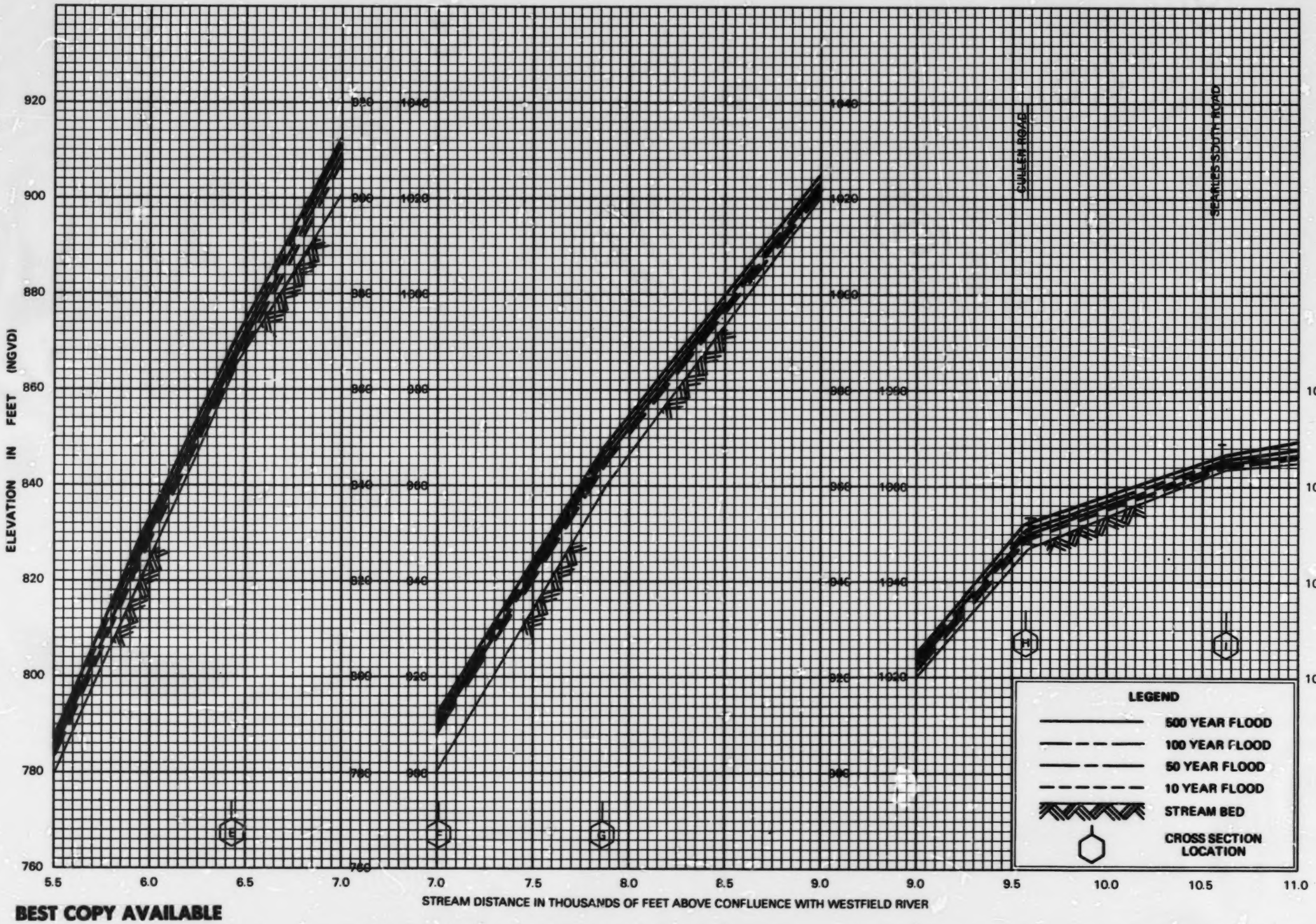

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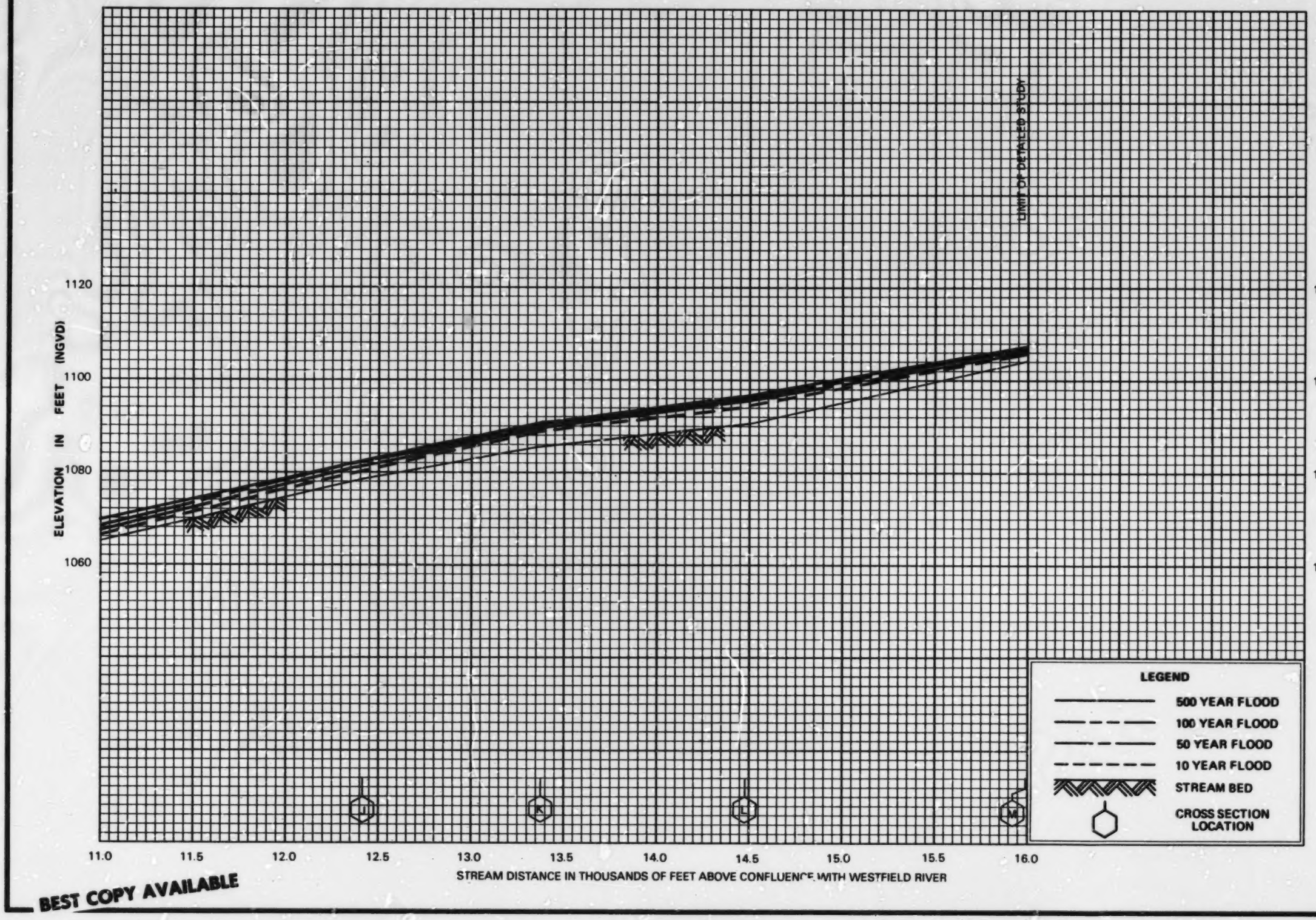

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POND BROOK

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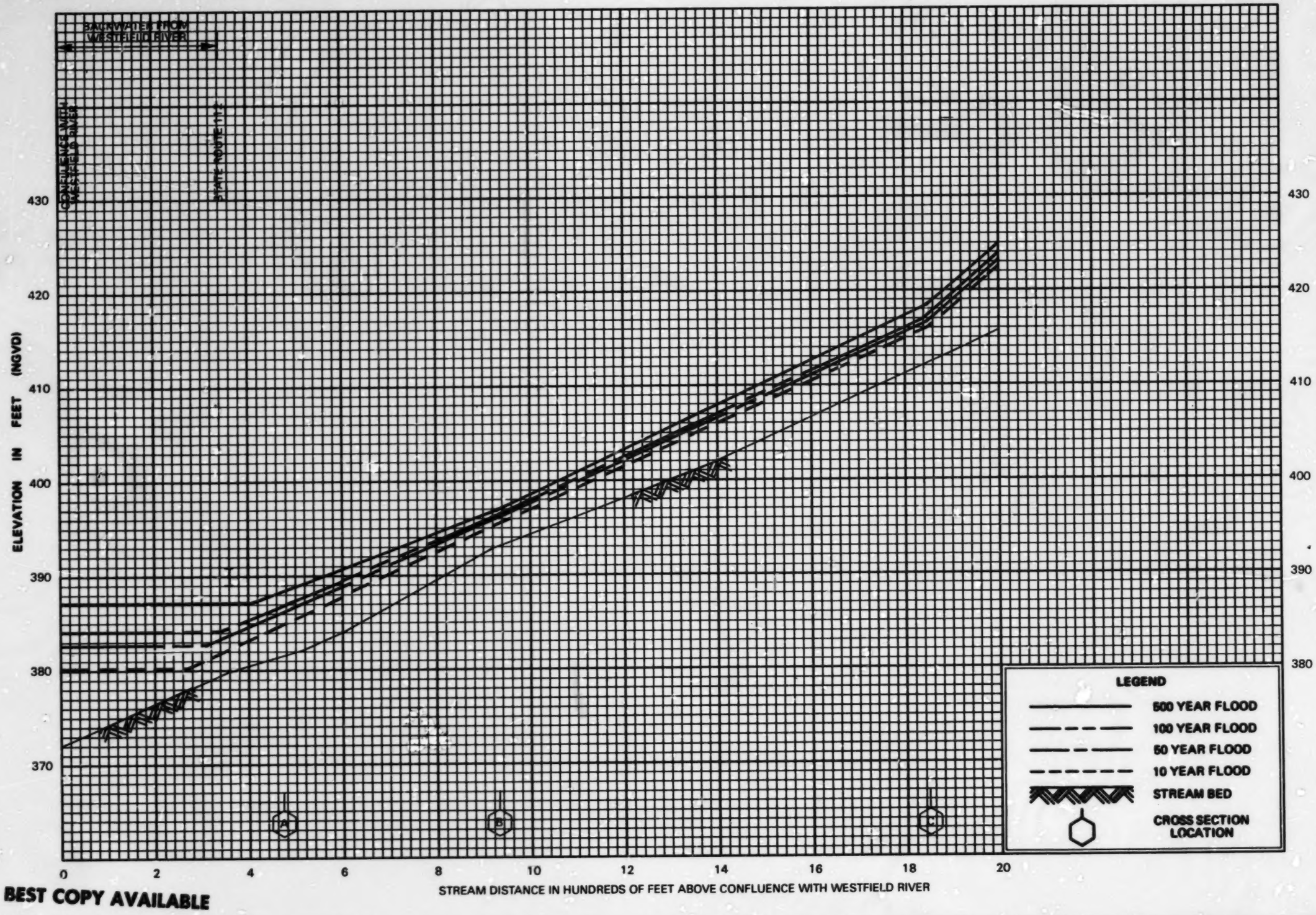

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(HAMPSHIRE CO.)

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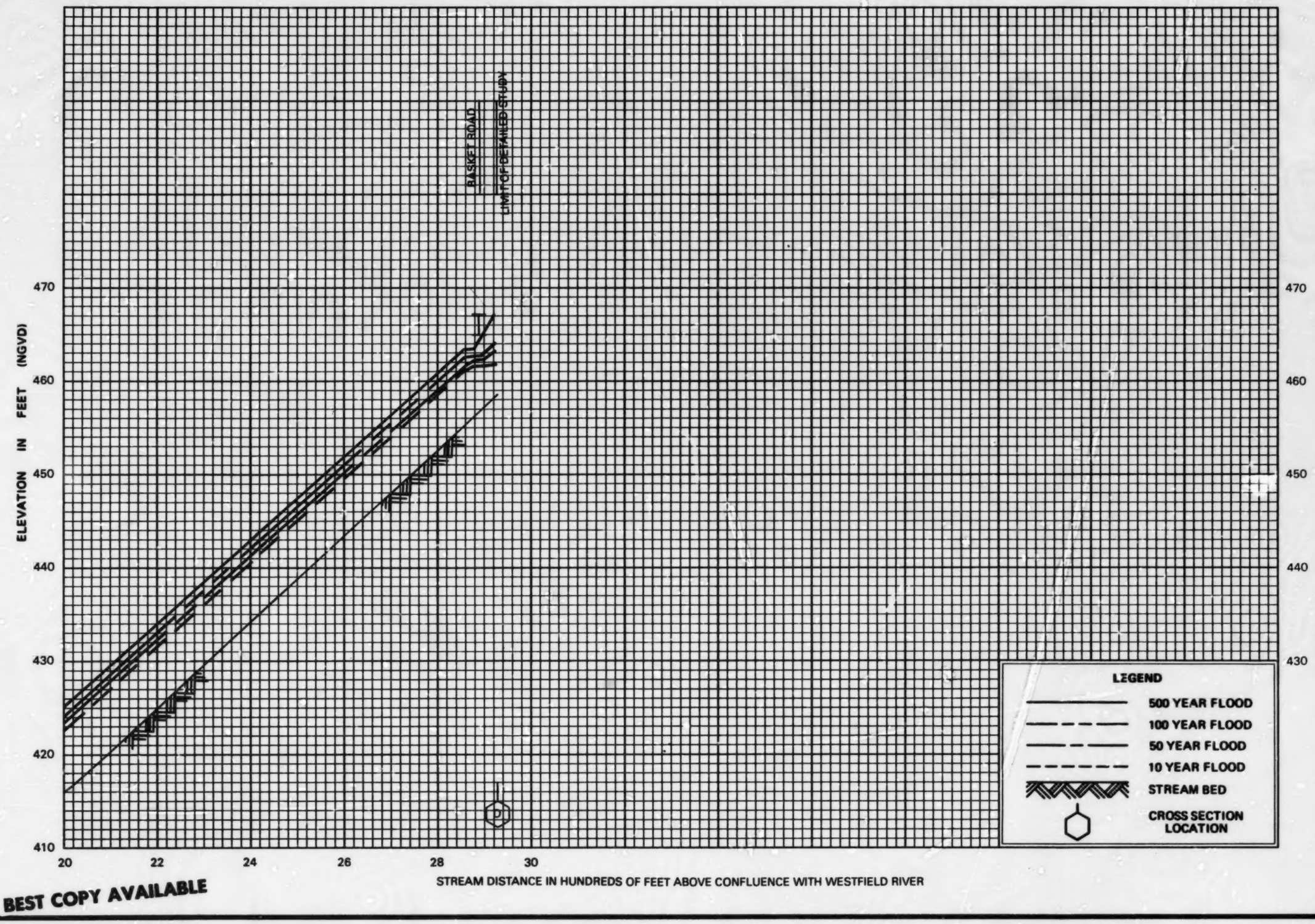

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